2004 GALVESTON BAY INVASIVE SPECIES RISK ASSESSMENT
INVASIVE SPECIES SUMMARY
Created by: Environmental Institute of Houston, University of Houston-Clear Lake
and the Houston Advanced Research Center

Common Name: Norway rat

Latin Name: *Rattus norvegicus*

Category: Terrestrial Animal

Place of Origin: Central Asia

Place of Introduction: "This species is believed to have arrived in the United States around 1776, in boxes of grain bought by the Hessian troops hired by Britain to fight the American colonists (Whitaker, 1980). It is a common pest around human settlements, throughout the Gulf ecosystem and the United States." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

Date of Introduction: 1776 http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

States Effected:
All US
"Widespread in Texas but not so common in the southern half of the state as the roof rat." http://www.nsrl.ttu.edu/tmot1/rattnorv.htm (Accessed 27 March 2003).

Life History:
"Norway rats reproduce throughout the year with peaks in spring (March-June) and fall (September-October) (Davis, 1951b). Females may bear as many as 12 litters per year of 2-22 young each. However, typically they bear 5 litters of 7-11 young (Lowery, 1974; Whitaker, 1980). Davis (1951e) reported an average of 8.7 young per litter, and 4.3 pregnancies per year based on pregnancy data of several hundred thousand Norway rats from cities of the United States and India. Because of high suckling mortality rates, this author estimated an average of 10 young weaned per female, per year. There is a postpartum estrus within 18 hours of birth (Nowak, 1991). Young are born naked and blind. They open their eyes in two weeks and are weaned at 3-4 weeks (Lowery, 1974; Whitaker, 1980). Females may begin to breed at three months of age (Whitaker, 1980)." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

"These rats are prolific breeders. The gestation period varies from 21 to 23 days and the number of young from two to 14, averaging seven or eight. At birth they are blind, naked, and helpless. They grow rapidly; their eyes open in 14-17 days and they are weaned when 3 or 4 weeks old. There is no delimited breeding season, but there is a tendency for a slow-up in reproduction during fall and winter. The life span is reported to be 2-3 years." http://www.nsrl.ttu.edu/tmot1/rattnorv.htm (Accessed 27 March 2003).

Growth/Size:
"Adults normally 150 - 300g may reach up to 500g total length up to 390mm."
http://www.issg.org/database/species/ecology.asp?si=159&fr=1&sts= (Accessed 27 March 2003).
"External measurements average: total length, 440 mm; tail, 205 mm; hind foot, 46 mm. Weight, 400-500 g."
http://www.nsrl.ttu.edu/tmot1/rattnorv.htm (Accessed 27 March 2003).

Feeding Habits/Diet:
"Norway rats are omnivorous. They feed on meat, insects, wild plants, seeds, stored grains, soap, hides, paper, etc. (Whitaker, 1980; Nowak, 1991). Norway rats have been reported to prefer animal matter (Whitaker, 1980; Nowak, 1991). They will kill poultry, feed on eggs, and are excellent at catching fish (Whitaker, 1980; Nowak, 1991). Mice and newly born farm animals such as lambs and pigs have also been reported as food items (Nowak, 1991)." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

"They feed on a variety of items including both plant and animal materials. All sorts of garbage appear to be welcome, but their main stay is plant material. Grains of various sorts are highly prized. When established around poultry houses, they feed extensively on eggs and young chickens. They even have been known to kill lambs and young pigs!" http://www.nsrl.ttu.edu/tmot1/rattnorv.htm (Accessed 27 March 2003).

Habitat:
"Norway rats are presently cosmopolitan in distribution, having been spread throughout the world by cargo ships. They are typically ground dwellers as opposed to black rats, *Rattus rattus*, which tend to climb more. Norway rats build underground burrows that contain long branching tunnels, multiple exits, and chambers for food storage and nests (Whitaker, 1980; Nowack, 1991). When inhabiting buildings they usually are found in the lower levels, occupying cellars and basements, and thriving in sewers (Nowak, 1991). They are common in cities and suburban areas throughout the Gulf states. They also occur in crop fields, well away from human habitations (Lowery, 1974). The typical home range for this species is between 25 and 150 m in diameter (Nowak, 1991). In the wild, they may live up to three years, but few live beyond two years of age, with most surviving only one year (Davis, 1948a;

Whitaker, 1980). Davis (1951e) estimated an overall mortality rate of 95% year, and a 97.5% mortality rate for weaned rats. Usually movements and migration are relatively rare (Davis, 1951e). However, when conditions of crowding occur, Norway rats may carry out mass migrations (Whitaker, 1980)." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

"The Norway, or brown, rat lives both as a commensal in close association with man and in the feral state, chiefly where vegetation is tall and rank and affords adequate protection. For example, the marshy lands on Galveston Island off the coast of Texas offer ideal habitat for them. As a commensal this rat lives principally in basements, on the ground floor, or in burrows under sidewalks or outbuildings. They appear to be most common about feed stores, chicken houses, and garbage dumps. Although more at home on the ground, these rats are adept at climbing and have been observed traveling along telephone wires from one building to another. In places they become exceedingly numerous and destructive." http://www.nsrl.ttu.edu/tmot1/rattnorv.htm (Accessed 27 March 2003).

Attitude/Impact (aggressive, etc.):

Norway rats have historically been one of the most harmful species humanity has known. The extensive damage they cause to human habitations and stored foods are minimal compared to the harm they have caused as a vector of disease. Rat-borne diseases have taken more human lives than all the wars in the history of humanity combined (Lowery, 1974). Millions of dollars have been spent trying to control populations of this species in urban settings alone (Lowery, 1974). Norway rats can rapidly recover from population crashes caused by disease or human control attempts, and are commonly found at the carrying capacity of their environment (Emlen et al., 1948; Davis, 1951d; Davis, 1951e).

In a recent survey of Norway rats from the United Kingdom, Webster and Macdonald (1995) reported 13 zoonotic and 10 non-zoonotic parasite species from a total of 509 rats examined. They reported the zoonotic helminthes *Capillaria, Hymenolepis diminuta* and *H. nana* in 23, 22 and 11% of the specimens examined respectively, the zoonotic bacteria *Leptospira spp.* which causes Weil's disease, in 14% of the specimens examined, *Listeria spp.* which causes listeriosis, in 11% of the specimens examined, *Yersinia enterocolitica* which causes yersiniosis, in 11% of the specimens examined, *Pasturella spp.* which causes Pasturellosis, in 6% of the specimens examined, and *Pseudomonas spp.* which causes Meilioidosis, in 4 % of the specimens examined; the protozoans *Cryptosporidium parvum* which causes cryptosporidiosis, in 63% of the specimens examined and *Toxoplasma gondii* which causes toxoplasmosis, in 35% of the specimens examined; and they found antibodies for the Rickettsian *Coxiella burnetii* which causes Q fever, in 34% of the specimens examined, and antibodies for the virus *Hantavirus* which causes Hantaan-fever or hemorrhagic fever, in 5% of the specimens examined. LeDuc (1987) presented a summary of the role of Norway rats in the spread of Hantaan and related viruses. He expressed concern both over the presence of infected wild Norway rats in the United States, and reports of infected laboratory rats. Webster and Macdonald (1995) found no evidence of Salmonella among specimens examined in the United Kingdom. Low percentages of Salmonella have been reported from other populations of Norway rats (Davis, 1948a; Davis, 1951c; Nakashima et al., 1978)." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

"This rat is globally widespread and costs primary industry hundreds of millions of dollars per year. It has caused/contributed to the extinction/range reduction of native mammals, birds, reptiles and invertebrates through predation and competition." http://www.issg.org/database/species/ecology.asp?si=159&fr=1&sts= (Accessed 27 March 2003).

Physical Description:

"Norway rats are brownish gray above; gray below. The tail is scaly and short, always less than half the total length. They have small eyes and prominent ears (Lowery, 1974; Whiteaker, 1980). The white rats commonly used in laboratories are albino strains of this species (Lowery, 1974; Whitaker, 1980). Spotted and black forms are known to occur (Lowery, 1974)." http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html (Accessed 27 March 2003).

"Brown fur on back with pale grey fur on belly. Adults normally 150 - 300g may reach up to 500g total length up to 390mm. Relatively small ears - usually don't cover the eyes when pulled forward, tail shorter than head-body length with pale underside. Females have 12 nipples." http://www.issg.org/database/species/ecology.asp?si=159&fr=1&sts= (Accessed 27 March 2003).

References (includes journals, agency/university reports, and internet links):

1. GSMFC - http://www.gsmfc.org/nis/nis/Rattus_norvegicus.html
2. ISSG - http://www.issg.org/database/species/ecology.asp?si=159&fr=1&sts= (Accessed 27 March 2003).
3. TPWD - http://www.nsrl.ttu.edu/tmot1/rattnorv.htm

Notes:

"Norway rats can be widespread utilising most habitat types, but they show a preference for wetland habitats." http://www.issg.org/database/species/ecology.asp?si=159&fr=1&sts= (Accessed 27 March 2003).